LT2ESWTR Conference Call
3 pm, June 11, 2001
Meeting Minutes

Participants
Steve Allgeier, EPA
Jeff Adams, EPA
Joe Jacangelo, Montgomery Watson
David Pearson, PCI Membrane Systems
Dan Uhr, Pall Corporation
Bruce Bartley, NSF International
Kristie Wilhelm, NSF International
Angela Smith, NSF International

CONFERENCE CALL BEGAN AT 3PM

Bruce Bartley began the conference call by explaining that this call is a follow-up to the discussion about the membrane and bag and cartridge systems portion of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) that occurred at the ETV Stakeholder Meeting for the Drinking Water Systems (DWS) Center on June 4-5th, 2001. The purpose of this call was to participate in the development of rule language for the LT2 ESWTR and to facilitate harmonization between ETV DWS Center and the LT2ESWTR.

Steve Allgeier began by stating that he is able to share the draft with everyone because it is not yet an EPA proposed document; it is still in draft form. Steve said that the draft document had already changed since the June 4th ETV meeting. He stated that is it now permissible to move the language to "guidance" as opposed to "rule/regulatory" which would offer more latitude for implementation as long as the intent is met.

Steve indicated that the following would remain rule language:

- Bag/Cartridge and Membranes – log removal observed during challenge study, criteria specified for having 8 studies and less or having more than 8 studies.
- There will be a cap specified for feed concentration, which is more of an issue for the bag and cartridge systems testing: 6-log for membranes and 4-log for bag and cartridge systems.
- *Cryptosporidium* or a suitable surrogate that is discretely quantifiable and has a removal rate that does not exceed *Cryptosporidium*.
- Full Scale must be tested but small scale can be tested if it can be scalable and operation conditions must match full scale.
- Establish performance criteria based on challenge study and integrity test results.
- For Bag/Cartridge, the challenge study must be performed at three points over filler run (three different headloss ranges to be specified in rule language).

Steve indicated that the following would most likely be in guidance language:

- Characteristics of challenge testing.
- Spiking.
- Enumeration.
- Number of samples.

Steve then opened the discussion to questions.

David Pearson posed three questions: 1) What are the integrity methods being discussed? 2) When will the final draft document be issued? and 3) What about alternate membrane configurations? Steve Allgeier answered: 1) Direct and indirect/continuous methods for integrity will be employed. 2) The rule language will be proposed by this calendar year. 3) The draft proposal will try to allow for all configurations. Steve then asked if integrity testing effects removal and requested any data on that issue.

Joe Jacangelo posed three questions: 1) What is the exact meaning of "scalable" and what the proposal language would be in terms of removal or operation, 2) What will be the required number of elements to be tested? and 3) What will the surrogates be? Fluorescent microspheres? Steve Allgeier responded: 1) "Scalability" will be in the guidance language. The rejection of target organism and the integrity test results would be tied together. 2) The number of elements will be in the guidance language and would be left up to the manufacturer or testing organization. 3) Yes, microspheres will be allowed as surrogate for *Cryptosporidium.* The guidance language will indicate that the size distribution should be comparable to *Cryptosporidium*, i.e. size dist below *Cryptosporidium*. Steve then requested an update on Joe's AWWARF project (Microbial Rating of Low Pressure Membranes) and asked if he could use the project as reference in the draft. Joe replied yes and that he would forward the information to Steve.

Jeff Adams asked for a description of scalability and integrity. Steve Allgeier answered that he envisioned that integrity testing would occur on a full-scale system. Steve explained that there is uncertainly as to whether integrity varies between small-scale and full-scale systems. Jeff asked if one has a demo on small scale would they have to be able to compare it to large scale? Steve answered yes. Jeff then wondered if the integrity testing would occur at the beginning and the end. Jeff asked Joe Jacangelo if the AWWARF study involved in integrity testing. Joe replied yes but the focus of the AWWARF project is bench testing to determine removal capabilities and it does not really address integrity full scale. Joe speculated that if one has removal capabilities at bench-scale and integrity testing results at bench and full-scale, he noted that one would have a good idea of scalability. Joe asked if the need exists to determine log removal at full scale, and he added that that was not the intent, correct? Steve agreed that that is not the intent.

Jeff Adams expressed concern regarding the number of elements to be tested. Steve Allgeier replied that he received a lot of comments regarding the number of elements that was specified in the last draft of the rule language. Steve noted that everyone said that this will not address variability and he added that this is achieved with manufacturer quality assurance (QA). Steve said that the question is how to link challenge test with QA.

Jeff Adams said that there is no mention of how long the runs are in the draft. Steve Allgeier answered that the guidance language would deal with that issue. Jeff then asked if a test run period is specified in the AWWAF study. Joe Jacangelo responded that the study is on a volume filter-basis.

Dan Uhr pointed out that some integrity testing is destructive, i.e. due to pressure hold or bubble point and cutting fibers. Dan noted that if integrity is ongoing and continuous then it is real time. Dan added that he is not sure if integrity can be correlated in bench testing to full scale because he noted that full scale testing has unique manufacturing elements individual to themselves. He thinks large elements should be tested on their own.

Bruce Bartley then asked if anyone wanted to add anything. Steve Allgeier then posed a question to Dan Uhr regarding whether his company typically performs challenge and integrity testing and correlates the results of both. Dan replied that they perform bubble point or air/pressure hold tests on entire batch or production. He noted that log removal is tied to QA/QC and integrity. Steve responded that this is what we are trying to do in the draft.

David Pearson noted that the more a State has primacy, then the greater the difference will be between states and ETV. Steve Allgeier added that States often take guidance language as most are left to their own devices and that he thinks that guidance would do a world of good for States to adopt.

David Pearson then returned to the issue of scalability. He mentioned spiral and hollow fibers. David noted that the integrity of bench testing would be different from that of full scale and he asked that the EPA is trying to separate the removal issue from integrity issues. David asked that bench testing is for removal by materials and integrity is at full scale. Steve Allgeier answered yes. Dan Uhr said that they are obliged to test elements for market.

Joe Jacangelo stated that he concurs with the approach that Steve Allgeier is proposing. Joe added that there is a need for data on scalability and full-scale microbial testing. He also added that ETV must be in line with this testing because everyone will require rules and guidelines. Finally, Joe asked if any information has been published on the issue.

Dan Uhr responded by saying that it is customer oriented and shared with customer. The data is proprietary. Joe asked if any of it addresses scalability. Dan then referred to sections of media and that the properties of the media are well known and correlated to integrity tests.

Bruce Bartley stated that the EPA's Office of Ground Water and Drinking Water (OGWDW) must come up with the LT2ESWTR language for rules and guidance, and that ETV can come in when these are published or ETV can lead and change its protocols to facilitate testing. Bruce noted the need for stakeholder input. Jeff Adams said that the ETV test plans should be compatible and that the ETV test plans may offer additions such as productivity issues. Steve Allgeier commented that it would be beneficial if ETV protocols were in place. He also said that it would be great for ETV to offer additional items that states are interested in, such as productivity.

Steve Allgeier said that he was developing a new draft to separate rule language from guidance language. Steve said that he would send the new drafts to Bruce and then Bruce could forward them on. Steve projected the revised rule language will be done by June 25, 2001 and added that the new guidance language would also be forthcoming.

Dan Uhr then asked if manufacturers would be involved. Steve answered that he had not received a response from WWEMA. Bruce Bartley said that others could be included, including the Center's general mailing list, and requested Dan Uhr and David Pearson to forward on the information. Dan Uhr replied that he would. David responded that the guidance section is what he would like to review. David added the need for a conference call after the guidance language documents had been received and reviewed.

Bruce Bartley stated that there is a difference between Bag/Cart and membranes, and suggested splitting the next conference call into two separate conference calls: one for membranes and one for bag and cartridges. Jeff Adams agreed. Bruce added that users, such as utilities, might also be interested and requested names of interested parties be forwarded to him. Bruce said that the next conference call will be convened after the next draft of the rule and guidance had been received from Steve Allgeier and everyone had the opportunity to review it.

CONFERNCE CALL ADJOURNED AT 4:30PM

LT2ESWTR & Bag/Cartridge Systems Conference Call
10:30 am, July 11, 2001
Meeting Minutes

Participants
Steve Allgeier, EPA
Chris McMeen, State of Washington
Dan Uhr, Pall Corporation
Gary Logsdon, Black and Veatch
Jerry Biberstine, National Rural Water Association
Bruce Bartley, NSF International
Kristie Wilhelm, NSF International
Angela Smith, NSF International

CONFERENCE CALL BEGAN AT 10:30AM

Bruce Bartley began the conference call by explaining that this call is a follow-up to the discussion about the bag and cartridge systems portion of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) that occurred during the conference call on June 11, 2001. The purpose of this call was to participate in the development of rule language for the LT2ESWTR and to facilitate harmonization between ETV Drinking Water Systems (DWS) Center and the LT2ESWTR.

Bruce Bartley began the conference call by making the introduction of participants. He then mentioned that email comments had been received from Brenda Land, Rick Sakaji and Chris McMeen and had been forwarded to Steve Allgeier for consideration.

Steve Allgeier pointed out that some items in the draft had been changed in the time since the last conference call on June 11, 2001. He then gave a brief overview of these changes:

- In the previous draft proposal, bag and cartridge system integrity testing issue was handled the same as membranes systems. There were a lot of comments concerning integrity testing of bag and cartridge filters. Majority of Bag/Cartridge filters are not integrity tested. Therefore the draft proposal was changed so that there is no provision for direct integrity testing for bag/cartridge filters and language was added so that cartridge membranes may be tested under membrane rules.
- The draft proposal has been changed back to 1-log removal of *Cryptosporidium* for bag filters and 2-log removal of *Cryptosporidium* for cartridge filters. There will be a 1-log removal factor of safety.

Bruce Bartley asked about the regulatory timeframe for the proposed LT2ESWTR for bag and cartridges and membrane system rules. Steve Allgeier answered that the EPA underwent a stakeholder process and established an agreement of principle for the development of the LT2ESTWR. EPA is currently working on proposed regulation and that the projected final rule language proposal would be available by the end of August 2001. He stated that it would be beneficial to have the guidance language finished at the same time as the rule language for internal review. He also stated that the EPA internal review process for this draft proposal would

occur from August 2001 until mid 2002. The open comment period would begin in mid 2002. Steve projected that the final regulation documentation, including both the rules and guidance language would be in place approximately early to mid 2003. Steve indicated that this timeframe would probably not shift forward in time, but may shift to later.

Chris McMeen asked if higher log removal credit could be given. Steve Allgeier answered no; higher log removal credit will not be given. Steve said that he knows that many small systems use the bag and cartridge filters as a sole treatment barrier, and this implication for small systems is huge. Steve added that the integrity test issue is not absolute yet, and that EPA needs input from States.

Chris McMeen also asked if it was the EPA's expectation under LT2 that a combination will be allowed with bag filters. Steve responded that any combination to meet the rule would be allowed, noting that ultraviolet (UV) radiation is the only option for *Cryptosporidium*. Chris then asked if this would take Bag/Cartridge filters off the table as an option for small systems. Steve answered that all systems will be under LT1. Chris noted that LT1 has not been promulgated. Chris mentioned that LT1 and LT2 should be building blocks of each other. Steve agreed and said that he would do a review of LT1.

Dan Uhr stated that companies can create products to meet required need, for example 6-log removal, but noted that there is no incentive for companies to make better products when they can already meet these low requirements, i.e. 1-log and 2-log removals. Steve Allgeier answered that the EPA is trying to leave the door open. He added that the EPA has made the distinction between technologies with the integrity testing and offered further discussion with Dan later on this issue.

Gary Logsdon commented that in challenge circumstances, there is a difference between the EPA and ETV requirements. He noted the potential for inherent head loss right away. Gary mentioned that the low end specified in the draft proposal is 1-5% headloss. He added that greater than 5% headloss may occur before there is a chance to do the challenge study. Gary referred to page 2 of the draft proposal and the use of the lowest value of eight challenge studies. Gary said that since money could be saved if there were less than eight challenge studies data points, most testers would opt for less than 8 points. Steve Allgeier agreed that there is a need for EPA and ETV standards to be the same, and noted the apparent loophole in number of challenge studies.

Gary Logsdon continued that some persons might want recoverable organisms in the effluent samples. He also suggested the need for clarity in the language, citing the term "stand-alone" as causing some confusion. Gary noted that all surface waters have to be disinfected. Steve Allgeier replied that all language referring to "stand-alone" has been deleted.

Steve Allgeier then addressed the headloss issue by asking what an appropriate percentage was, noting that capping at 95-100% headloss had caused concern. He added that 100% headloss requires the appropriate testing. Bruce Bartley added that an absolute value of 100% headloss would be difficult. Kristie Wilhelm stated that the ETV protocol calls for a challenge event at

greater than 90% headloss. Bruce then asked if testing is done at 92%, then the results according to the proposed draft couldn't be used. Steve answered yes.

Dan Uhr mentioned that NSF/ANSI Standard 53 (for point of use and point of entry devices) uses a 150% headloss challenge. Steve Allgeier then commented on the unlikeness of regulations including 150% headloss challenge.

Gary Logsdon stated that it is critical from a regulations standpoint to give good guidance on how these systems should be operated. He said that if there is failure of bag and cartridge systems at start up, then perhaps units be started up more slowly, rather than full flow at start up. He also suggested more operator education as opposed to regulation. Steve noted the need for consideration of installation criteria in the guidance proposal language and said that drafting this type of language into the regulations would not be practical because each product is so different.

Steve Allgeier stated that there are many differing opinions on the maximum challenge headloss range and that there is a need to look for means to resolve the differences between EPA and ETV. Steve also touched on the issue raised by Chris McMeen regarding bag/cartridge filtrations being the only filtration used by a utility. Steve suggested that this issue be discussed offline due to the fact that it is not necessarily an ETV issue. Chris then added that ETV is what the States are using, but there are no ETV reports yet. Steve Allgeier again offered to study how LT1 and LT2 can work together.

Steve Allgeier said that bag and cartridge studies performed to date have not shown good turbidity removal data to ensure integrity of filter. Steve said a conventional utility could use turbidity for integrity, but what other type of tool do we have for bag and cartridges?

Bruce Bartley then stated that the ETV DWS Center would review the ETV Bag and Cartridge Test Plan and the proposed LT2ESWTR with Gary Logsdon to summarize the differences between the two documents. Bruce said that there should be a group effort on addressing O&M issues.

Bruce Bartley ended the conference call by requesting that all comments on the draft LT2ESWTR proposal be sent to Steve Allgeier. Steve Allgeier said that he would inform the group of the next step or about the next draft.

CONFERENCE CALL ADJOURNED AT 11:30AM

LT2ESWTR & Membranes Conference Call
11am, July 12, 2001
Meeting Minutes

Participants
Steve Allgeier, EPA
Jeff Adams, EPA
Samer Adham, Montgomery Watson
Carl Gransmith, Montgomery Watson
Joe Jacangelo, Montgomery Watson
Dan Uhr, Pall Corporation
Bruce Bartley, NSF International
Kristie Wilhelm, NSF International
Angela Smith, NSF International

CONFERENCE CALL BEGAN AT 11AM

Bruce Bartley began the conference call by explaining that this call is a follow-up to the discussion about the membrane portion of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) that occurred during the conference call on June 11, 2001. The purpose of this call was to participate in the development of rule language for the LT2ESWTR and to facilitate harmonization between ETV Drinking Water Systems (DWS) Center and the LT2ESWTR.

Bruce Bartley introduced the participants. He then mentioned that email comments had been received from Rick Sakaji.

Steve Allgeier began by explaining that the draft LT2ESWTR proposal language is outlined in the draft of the rule and guidance language documents that he circulated. Steve noted the following key components:

- Demonstration of challenge test.
- Integrity testing requirements.
- Continuous indirect monitoring by turbidity monitoring, with primacy agency allowed to approve alternatives.

Bruce Bartley then reviewed the LT2ESWTR development schedule as stated by Steve Allgeier in the previous bag and cartridge system conference call. The projected final proposal language would be available by the end of August 2001. The EPA review process for this documentation would occur from August 2001 until mid 2002. The open comment period will begin mid 2002. Steve projected that the final regulation documentation, including both the rules and guidance language would be in place approximately early 2003. Steve added that the guidance and rule language would be referenced at same time. Steve indicated that this timeframe would probably not shift forward in time, but may shift later.

Samer Adham asked what the EPA had in mind for challenge testing at full scale. Steve Allgeier responded that the EPA is considering changing this language. Steve noted that consideration is being given for challenge testing at a certain design flux and recovery so that it would be non-site specific. Samer then noted that companies usually have an optimal design recommendation and maximum design conditions. Steve said that the EPA is open for comments on this issue.

Joe Jacangelo questioned what is the maximum? Steve Allgeier replied that the manufacturers would set the maximum. Joe noted that maximum and optimal conditions were site specific and that flux would change with material build-up on the membrane. Steve answered that a very clean water would be used to avoid material build-up on the membrane.

Dan Uhr then added that there are different classes of water, i.e. ground water, surface water. Steve responded that companies could get different ratings on different classes of water, but the idea for LT2 is to do a single test on very low turbid water to assess pathogen removal. Samer Adham noted that with clean water, particle counts could not be used as a surrogate. Steve replied that this sounded like a site-specific issue and mentioned that particle counting may be a monitoring tool used by testers. Samer asked if seeding challenges would be required per rule. Steve Allgeier answered yes. Bruce Bartley added that ETV seeding is currently an optional task in the ETV Membrane Test Plan for Physical Removal. Bruce said that the ETV protocol would have to be changed to a requirement to meet the rule requirements. Steve agreed. Bruce noted that the ETV has challenge data on very clean water from tests conducted in Pittsburgh if EPA wanted to review some challenge studies.

Jeff Adams then brought up the issue of number of elements to be tested to calculate variability. Steve Allgeier answered that this would be difficult to determine. Dan Uhr added that manufacturers have quality control range testing. Steve stated the EPA was considering using performance criteria. Jeff said that the rule or guidance language would have to have clarification on number of elements and quality control. Steve answered that it would be a good idea to include examples in the guidance language and he said that he is open to suggestions on rule language. Samer Adham offered that the ASTM has a draft. Steve noted that there is flexibility in ASTM. Steve said that each company has its own preference based upon their products.

Samer Adham asked for a description of the rationale for 3 um resolution requirement for the integrity test. Steve Allgeier answered that 3 um is based on lower size range of *Cryptosporidium*, which is the target organism in the LT2ESWTR. Steve mentioned that this is also resolution and not sensitivity. Steve said that with 3 um resolution then a 3 um defect would show up in an integrity test. Samer then asked if the EPA had contacted the membrane manufacturers to see if they could meet 3 um resolution. Steve replied yes, that the manufacturers he contacted could meet this requirement.

Dan Uhr brought up the non-disposal language referenced on p.8 of the proposed draft language. Steve Allgeier replied that that language had been eliminated from the draft.

Dan Uhr asked if surrogates for organisms would be in the draft. Steve Allgeier said that the EPA is open to suggestions. Kristie Wilhelm noted that the ETV protocol for membranes requires that microbiological organisms be used, i.e. no surrogates. Steve mentioned that

surrogates will be allowed in the LT2 for Bag/Cartridge systems and the tester would have to prove that the surrogates are removed no better than *Cryptosporidium*, as a conservative measure. Joe Jacangelo noted that there are no membrane studies that have a good correlation of surrogates and organisms.

Bruce Bartley then asked for information on what the California Department of Health Services is doing about seeding challenges. Samer Adham responded that they allow the use of particle counts in lieu of seeding and that the DHS is adding virus challenge as requirement. Samer then asked if virus would be added to the rule language. Steve replied no, the EPA is not going to require this because this rule is strictly for *Cryptosporidium*, but added the possibility of writing it into the guidance language. Samer stated that they have found that seeding with MS2 is easier than seeding with *Cryptosporidium* and *Giardia*. Samer also noted that because it is a smaller microorganism, if the membrane removes MS2 virus, then it would be assumed to removed *Cryptosporidium* and *Giardia* as well. Dan Uhr pointed out the short-term viability of MS2, and added that there is argument over the mechanism of removal as well as the fact that MS2 virus might not be representative of all viruses. Steve Allgeier responded that the rule language currently as written would allow for MS2 as a surrogate because it is a smaller organism; however, the rule would not give credit for virus removal (only *Cryptosporidium* log removal credit).

Joe Jacangelo asked if you used 3 um microspheres as a surrogate for *Cryptosporidium* would a tester then have to demonstrate that it is an applicable surrogate? Steve Allgeier stated that more data on this issue is needed.

Joe Jacangelo also asked Steve Allgeier to summarize bench testing. Steve replied that there is not enough data on scalability, but the rule leaves room for interpretation. Joe asked if the primary issue was integrity and scalability. Steve answered yes. Joe Jacangelo, Steve Allgeier and Dan Uhr discussed air/pressure hold testing. Steve stated that the key to the regulation is that a log removal credit be linked to an integrity test and then all other production modules must meet this integrity test level to receive log removal credit. Joe then asked Dan if his corporation tests all elements. Dan replied yes, there is a non-destructive test done to assess the rate of decay.

Bruce Bartley asked Steve Allgeier to describe the next step, and Steve responded that when he receives the next draft that has been approved by EPA management, he would circulate it. Steve also stated that if there is an ETV protocol in place for testing then the guidance language could be referenced from that. Steve asked Bruce about the timeline for the ETV protocol revisions. Bruce answered that he would be in contact with Joe Jacangelo and Samer Adham to revise the ETV protocol. Bruce also explained the ETV revision process, which includes a redraft of the protocol, a 45-day review period by the States and other interested stakeholders, and a balloting period by the 16-member steering committee. Bruce said that as an estimate, the DWS Center could try for a revised protocol by the end of 2001. Steve responded that the ETV timeline could work if EPA and ETV were in communication during the revision process.

Jeff Adams then asked if the information Joe Jacangelo would receive from the AWWARF study could be used in the revision of the ETV protocol. Joe responded that there is the issue of non-

standardized bench testing. Bruce Bartley the suggested further discussion of this topic offline. Jeff then asked if the AWWARF study was with organisms and Joe answered yes, they were using a variety of viruses, bacteria, *Cryptosporidium*, *Giardia* and fluorescent microspheres.

Bruce Bartley stated that ETV has microsphere data for bag/cartridge filters and also that he would check with Rob Herman of NSF regarding ANSI/NSF Standard 53 and the use of microspheres and organisms. Jeff Adams then referenced the Goodrich and Li AWWA article. Joe Jacangelo said that he would also gather all relevant information.

Bruce Bartley asked Dan Uhr for his assistance on the development of a manufacturer's forum, which the ETV would coordinate. Bruce added that he would follow up with Joe Jacangelo and Samer Adham regarding the ETV protocol revisions.

CONFERENCE CALL ADJOURNED AT APPROXIMATELY 12:30PM